

**SOME LOCAL SCHOLARS WHO COUNSELLED THE PROPRIETORS OF PENNSYLVANIA
AND THEIR COMMISSIONERS DURING THE BOUNDARY
SURVEYS OF THE 1760's***

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IN a recent paper¹ there were presented all of the British scientists and technologists who are known to have advised the proprietor of Maryland and those of Pennsylvania during the period when the final survey of their common boundaries was being organized, equipped, and staffed. The American scientists and technologists who participated in this endeavor are still to be presented.

On July 4, 1760, there was enrolled in the High Court of Chancery an indenture of agreement which Frederick, last Baron of Baltimore, and Thomas and Richard Penn had just signed. It was their final agreement to survey and mark their common boundaries. On the following day Baltimore named seven commissioners from Maryland and the Penns seven from Pennsylvania and the Three Lower Counties, to supervise together the surveying and marking of the boundaries. Ten weeks later news of the events of July fourth and fifth in London came to Philadelphia on H. M. S. *Mercury*. And, with a letter² of September 15 Governor James Hamilton of Pennsylvania transmitted to Governor Horatio Sharpe of Maryland a copy of the agreement of July 4 and the commissions sent to him by Lord Baltimore. In his letter Governor Hamilton gave Governor Sharpe the names of the seven commissioners who would represent Pennsylvania and asked him to suggest the time and place of the first joint meeting. Four days later Governor Sharpe acknowledged² the receipt of Governor Hamilton's letter and of the documents which accompanied it, gave him the names of the Maryland commissioners

and promised an early selection of the time and place of the first joint meeting of commissioners.

It appears that the Pennsylvania Commissioners began at once to prepare for their meeting with the Commissioners for Maryland for on October 22, 1760, the Rev. William Smith, Provost of the College of Philadelphia, wrote³ to Thomas Penn as follows:

At the Desire of the Commissioners for running the Lines, I have within this Fortnight past carefully examined all the Schemes offered for that Purpose, . . . Mr. Jack's and Mr. Alexander's 2d Scheme are the best and nearly the same.

Provost Smith then analyzed several of the procedures which had been suggested and indicated his preferences. He continued:

. . . the whole Work will be no more this way than what appears on the enclosed Paper, which any Mathematician will tell you is exact & strictly demonstrable.

I lately saw Mr. Malcolm, the Mathematician & one of the Maryland Commissioners, & had a good Deal of Conversation with him at Annapolis. I believe the Preliminaries will be settled between him & me in Presence of the Commissioners. I find he is agreed with me in every Thing. He is an old Acquaintance of mine & a very reasonable as well as able man. . . . I must own that as my rank is [in] no way inferior to Mr. Malcolm's it would have given me Pleasure to have met him on an equal Footing, as much honoured by this Province as he is by his Province. One might have thought that as we had a Seminary of Learning here, it might have furnished at least one hand in running the Lines of two Provinces, & it might have been for the Honor of the Commission to have had one Person professing Mathematical Knowledge in it, as well as in that of the other Province. . . .

The commissioners for Maryland and for Pennsylvania met in their first joint session at New

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¹ Cope, T. D., and Robinson, H. W., When the Maryland-Pennsylvania boundary survey changed from a political and legal struggle into a scientific and technological project, *Proc. Amer. Philos. Soc.* 98 (6): 432-441, 1954.

² Correspondence of Gov. Sharpe (Archives of Maryland), 2: 449-450.

³ PMOC 9: 143. Manuscripts preserved by the Historical Society of Pennsylvania are in PLB, Penn Letter Books; PMB, Penn Manuscripts, Boundaries; PMOC, Penn Manuscripts, Official Correspondence.

Castle on the Delaware on November 19, 1760, and remained in session until December 11. They agreed upon procedures to be followed in running the line which is now the major part of the western boundary of Delaware. The southern boundary of Delaware had been surveyed and marked in 1751. It is the eastern half of an "east-west" line from Fenwick Island to the eastern shore of Chesapeake Bay. The Middle Point of this transpeninsular line became the southwest corner of Delaware. From the Middle Point a line was to be run in the right direction to become tangent on its western side to the circle of radius twelve miles described about the court-house in New Castle as a center. At the conference of commissioners held in New Castle, as mentioned above, procedures for running the Tangent Line were agreed upon and surveyors were engaged to undertake the work. The Rev. Alex. Malcolm was too ill to attend the conference and the ideas of Provost William Smith failed to receive a hearing. But Provost Smith continued to be thought of as one who might help in the survey. Soon after his return to Annapolis from the conference in New Castle, Governor Sharpe wrote⁴ on December 22 to Cecilius Calvert, an uncle of Frederick Lord Baltimore, who was then His Lordship's secretary. The Governor said:

If the Gentlemen who may be consulted should be clearly of the Opinion that the best Method of finding the Point from which the North Boundary [of Maryland] must be run will be to take Observations, I believe it will be better for His Ldp & the Messrs Penns to have a good Instrument made in London at their joint Expence for the purpose & on its Arrival we can I believe get the Mathematical Master from Williamsburg to go up & together with Dr. Smith Provost of the Philaa Academy (whom I presume the Pennsylvania commissioners will engage) take such Observations as may be thought expedient.

The idea of Dr. William Smith's participation in the survey of the boundaries apparently had little appeal to Proprietor Thomas Penn, as occasional remarks in Mr. Penn's letters reveal. In a letter⁵ to Governor Hamilton dated January 9, 1761, Mr. Penn remarks that commissioners are to be free "to proceed with the best Mathematical Advice they can get. . . ." In reference to the selection of commissioners, Mr. Penn suggests to Governor Hamilton,

if you think proper Dr. Smith, who I find would not have been displeas'd to have been nam'd. . . . I did not think he could have been spared from the College. . . . I desire you will appoint such Persons, as you think the best qualified for the Business.

To Dr. Smith himself Mr. Penn said by letter⁶ of Jan. 10,

I return you my thanks for your Assistances to the Commissioners . . . but could not name you, as I conceived your presence at the College was necessary. I have desired the thoughts of Mr. Harris Mastr of the Mathematical School at Christ's Hospital on your proposition. . . .

Minutes of the conference of commissioners held at New Castle during the late autumn of 1760 had been sent to the proprietors. By March 13, 1761 Thomas Penn had received his copy and in a letter⁷ of that date addressed to Governor Hamilton Mr. Penn remarked:

I do not see by the Minutes that Dr. Smith's Scheme was offer'd and consider'd. . . . I leave it entirely to your judgment whether to appoint Dr. Smith a Commissioner or not, I think there may be some little danger of his being too much prejudic'd in favour of his own Schemes, and tho' he may have a knowledge superior to John Watson and others, in the Theory of Surveying, he has not been accus'tom'd to the practical part of it, and therefore perhaps as the best Scheme on paper may not be the most certain on Earth, his abilities may not be so useful as others, tho' inferior.

The question of accepting Provost Smith's offer to serve as a commissioner for Pennsylvania remained in Thomas Penn's mind. By August, 1761, the Provost's Scheme and certain queries about the survey that he had raised had been reviewed by Mr. Penn's principal technological adviser, John Robertson, Head Master of the Royal [Naval] Academy at Portsmouth. In his letter⁸ to Governor Hamilton of August 7 Mr. Penn said:

I send you with this Mr. Robertson, Master of the Academy's Answers to Dr. Smith's Queries, and find by him he has no great opinion of the Doctor's Mathematical Abilities, so that there cannot be any use in making him a Commissioner, or I believe consulting him in case of any difficulty.

When the year changed to 1762 the question of Dr. Smith was still on the mind of Thomas Penn.

⁴ Correspondence of Governor Sharpe (Archives of Maryland), 2: 482.

⁵ PLB 6: 351-356.

⁶ PLB 6: 360-361.

⁷ PLB 7: 4-7.

⁸ PLB 7: 57.

In a letter⁹ to Governor Hamilton dated Jan. 9, 1762 Mr. Penn wrote:

I am greatly pleased that you have prevailed with Mr. Coleman to be one of the Commissioners, and that Mr. Holt has quitted it so handsomely . . . you will do as you think proper with regard to Dr. Smith but I join with you in opinion that Mr. Coleman is much to be preferred. . . . I fear Dr. Smith's Mathematics are rather superficial as he does not allow himself time to enter seriously into the consideration of Business before he engages in it. . . .

And one month later Mr. Penn wrote to Dr. Smith a long and friendly letter¹⁰ about affairs in general including some of the problems of the survey. Penn and Smith continued to be friends and to exchange letters. And the Provost could not forget his ambition to serve the Province as a commissioner, for he was unhappy when not in the public eye. Three years later, on Feb. 15, 1765, Thomas Penn was moved to say to Dr. Smith in reply,¹¹ to a communication from him:

I am very sensible of the services you have done with regard to the Commission for running the Lines, but I should never have consented to have had you taken from the College for any such service, I think you should not be employed in any service that should oblige you to be absent from it, and therefore in case there should be any other wanting cannot think of desiring your assistance—The mathematical part of these Lines we leave to the Surveyors, and therefore the Gentlemen that are appointed Commissioners have the less occasion to be Mathematicians. I return you my thanks however for your readiness to assist us in that Affair. I am sorry your not having been appointed should have been injurious to you, but it cannot have been seriously supposed to proceed from either of the Causes you mention.

The letter which Provost William Smith wrote³ to Thomas Penn on Oct. 22, 1760, conveys two principal messages, the first of which is that the Provost had reviewed all schemes for running the Tangent Line that had been proposed to the commissioners for Pennsylvania and was offering in their stead "on the enclosed Paper" a simpler and better scheme of his own. The second message advised Proprietor Penn to appoint William Smith one of his commissioners. The scheme "on the enclosed Paper" was in all probability the one which Mr. Penn referred⁶ to Daniel Harris, Master of the Mathematical School at Christ's Hospital, for comment.

⁹ PLB 7: 96.

¹⁰ PLB 7: 105-106.

¹¹ PLB 8: 222-224.

And the scheme "on the enclosed Paper" received many comments in the correspondence of Thomas Penn which enable one to recognize it. There is hardly a doubt that it is the scheme preserved in copy by the Historical Society of Pennsylvania under the title, "Dr. Smith's Scheme for running the Tangent Line—Copp." ¹² When one reads the "Scheme" today, almost two-hundred years after 1760, one sees in it many sound ideas that were soon put to use. It was a simple scheme—on paper at least. But running the Tangent Line kept the provincial surveyors at work through 1761, 1762, and well through 1763, with no final success in sight. Mason and Dixon finally took it over in June, 1764, worked on it continuously and brought it to completion during the following November. More was needed to survey the Tangent Line than Provost William Smith's academic knowledge of geometry.

In their excellent, comprehensive bibliography entitled "Manuscripts and Publications relating to the Mason and Dixon Line . . ." ¹³ the late Edward L. Burchard and the late Edward B. Mathews list "Dr. Smith's Scheme" as follows:

1761, Feb. Demonstration by Dr. Robert Smith "Scheme for running the tangent lines". 2pp. fol. with diag. Ms. Copy. Pa. Hist. Soc., Penn. Mss. "Boundaries", p. 94. Note: Dr. Smith was professor of astronomy and Vice Chancellor of Cambridge Univ. and founder of its Smith mathematical prizes.

Thomas Penn mentioned his advisers freely in his letters. No mention of Professor Robert Smith has been found in his correspondence. The original of the exhibit in folder 94 of Penn. Mss. Boundaries was mailed on October 22, 1760, by Provost William Smith and all discussion of it was made in letters to him or in references to him in other letters.

And Provost William Smith appears to have taken part in the discussion of how to run a parallel of latitude in preparation for the survey of the boundary line between Maryland and Pennsylvania. His contribution is contained in eight queries which are preserved by the Historical Society of Pennsylvania in its Penn Manuscripts, Boundaries, folders 68 and 81. They are entitled "Queries, On the 2^d 4th & 8th of the Original

¹² PMB, folder 94.

¹³ Published as part IV of the Report on the Resurvey of the Maryland-Pennsylvania Boundary, Maryland Geological Survey, 7, Baltimore, 1908; Penna. Dept. Internal Affairs, Harrisburg, 1909.

Articles between the proprietors of Maryland and Pennsylvania." Folder 81 contains only the queries; folder 68 includes also John Robertson's answers dated July 6, 1761, and an essay of the same date by Robertson on running a parallel of latitude. Letters¹⁴ written during the spring, summer, and autumn of 1761 identify the "Queries" with "Dr. Smith." Thomas Penn to Governor Hamilton on April 13 says:

Shall send you answers to the several queries made by Dr. Smith on the best method of running a parallel of Latitude, having laid them before Mr. Simpson of the [Military] Academy at Woolwich.

An equivalent statement appears in a letter to Secretary Peters of the same date. On April 28, 1761 Thomas Penn says in a letter to John Robertson

... there is to be a West Line run ... which is to be a parallel of Latitude, and I have received some Queries relating to it, which I am desired by my Commissioners to get answers to, from some able Mathematician; these I enclose to you. . . .

A few days later, on May 9, Mr. Penn tells Provincial Secretary Richard Peters that

Mr. Simpson the Master of the Academy at Woolwich being in the North of England and to stay there a very long time, [He was ill and soon died] I have sent the Queries to Mr. Robertson Master of the [Naval] Academy at Portsmouth. . . .

On August 7 Mr. Penn wrote to Governor Hamilton

I send you with this Mr. Robertson, Master of the Academy's Answers to Dr. Smith's Queries, and find by him he has no great opinion of the Doctor's Mathematical Abilities. . . .

To Secretary Peters Mr. Penn added on August 8,

I send you enclosed Mr. Robertson's answers to the Queries made by Dr. Smith. . . . Mr. Robertson has added to the Answers a Scheme for running the Parallel of Latitude, and I have some of the Instruments making here for it, . . .

And to his commissioners Mr. Penn wrote on October 9, 1761:

We sent by the last Packet to Mr. Hamilton, a copy of Mr. Robertson's answers to the Queries proposed by Dr. Smith, . . . I send with this another Copy of these Answers, and also a Copy of some observations made upon it by a very ingenious gentleman [Dr. John Bevis], on whom Lord Baltimore much

¹⁴ All in PLB 7.

rely, for yours & your Mathematicians consideration, both these I propose to shew to Mr. Daval, who is now at Bath. . . .

Two suggestions made by Provost Smith in his letter³ to Thomas Penn of October 22, 1760, appealed to the administrators of Pennsylvania and brought results, *viz.* that Philadelphia's "Seminary of Learning furnish at least one hand in running the Lines" and that the commission representing Pennsylvania have in it "one Person professing Mathematical Knowledge." Both suggestions were put into effect on July 23, 1762, when Governor James Hamilton appointed the Rev. John Ewing a member of his commission.

The Rev. John Ewing, a native of Cecil County, Maryland, was just thirty years of age in 1762. He had been educated in the Rev. Francis Alison's academy at New London, Pennsylvania, and at the College of New Jersey, from which he had won his bachelor's degree in 1755. He had then studied theology with Dr. Alison and had been licensed to preach by the presbytery of New Castle. His major interest in school and college had been mathematics. He had been an assistant teacher in the New London Academy and in the grammar school associated with the college in Princeton. During the winter of 1758-59, while Provost Smith was on a journey to England, the Rev. John Ewing had conducted the philosophical classes in the College of Philadelphia. And during the year 1759 the Rev. John Ewing had received and had accepted a call to the pastorate of the First Presbyterian Church of Philadelphia. When Thomas Penn learned that John Ewing had been appointed to the commission which was conducting the survey of the boundary lines he expressed his warm approval by letter¹⁵ of December 10, 1762, to Governor Hamilton.

By midsummer of 1762 it had become evident to all involved that the provincial surveyors were having a considerable struggle with the Tangent Line which they were instructed to lay off from the Middle Point to touch the circle of twelve miles radius about the court-house in New Castle on its western side. Their instructions were to run a measured arc of meridian northwards from the Middle Point until the court-house was in sight, then to run a line to the court-house measuring its length and bearing. From the data obtained, the bearing of the Tangent Line and the position of the Tangent Point were to be calculated. The Tangent Point was to be marked by

¹⁵ PLB 7: 224-227.

posts set in the ground, and the Tangent Line was to be run at the bearing calculated from the Middle Point until it passed near the posts set to mark the Tangent Point. The surveyors had worked from early spring until late autumn in 1761, and had been working since early spring in 1762. In fact they continued until late autumn of 1762 and again from early spring of 1763 until early autumn of that year without achieving an acceptable Tangent Line.

By midsummer of 1762 when Governor Hamilton brought the Rev. John Ewing into the survey both the Pennsylvanians and the Marylanders were thinking of securing talent from England to take charge of the survey. Thomas Penn had let it be known that at John Robertson's advice he was having a zenith-sector built for running the Maryland-Pennsylvania boundary. By letter¹⁶ of August 14 Mr. Penn told Governor Hamilton, "I propose to send in conjunction with Lord Baltimore, one or two Persons with our Sector to take observations, if his Lordship will agree to it." And a later letter¹⁷ of Mr. Penn's makes it clear that he had Mason and Dixon in mind in August, 1762. By letter¹⁸ of September 25, Governor Horatio Sharpe of Maryland appealed to Lord Baltimore to find in England, "a gentleman of mathematical ability and integrity . . . to come hither to direct and superintend the work." Communications were slow in those days and Lord Baltimore was most of the time somewhere along the Mediterranean. Not until July, 1763 did he finally agree to Thomas Penn's proposal that they jointly send Mason and Dixon to America. News of that decision reached Maryland and Pennsylvania late in the summer. In the meantime the provincial surveyors had continued their work on the Tangent Line.

When it was finally certain that the proprietors of both provinces were jointly sending Mason and Dixon to do the surveying the commissioners in both Pennsylvania and Maryland set about to prepare summaries and appraisals of what had been accomplished during 1761, 1762, and 1763. Letters¹⁹ were written to Thomas and Richard Penn by their commissioners on September 30 and on December 20, 1763, which present in considerable detail what had been accomplished on the Tangent Line.

¹⁶ PLB 7: 182-183.

¹⁷ PLB 7: 292-293.

¹⁸ Correspondence of Governor Sharpe (Archives of Maryland), 3: 71-75.

¹⁹ PMOC 9: 201-202; PMB, folder 115.

The later letter enclosed two exhibits²⁰ which the Rev. John Ewing had prepared entitled "A Representation of Facts, and a Draught delineating the Two Lines last run."

In his reply²¹ to the commissioners dated April 13, 1764, Thomas Penn acknowledged receipt of both letters and said that he had conferred with Cecilius Calvert, Lord Baltimore's secretary, and with Dr. Bevis, who had studied Ewing's reports, and with Mr. Harris. He reported that the Maryland commissioners had submitted a report similar to Mr. Ewing's prepared for them by one of their number, the Rev. John Barclay, a mathematician. All were agreed, said Mr. Penn, that regardless of expense, the Tangent Line should be run again by Mason and Dixon using their transit instrument, which they had just brought to America. It had been built for Mr. Penn by John Bird, the foremost instrument maker of the time.²² And during a series of joint meetings held in Philadelphia during the previous November and December, on December 9 the commissioners of both provinces had instructed Mason and Dixon to the same effect. They were to undertake the Tangent Line on June 15, 1764, and were to be guided by the Hints prepared jointly by Dr. Bevis and Mr. Harris. The Hints had been commended to both boards of commissioners by Cecilius Calvert and by Thomas and Richard Penn.

Mason and Dixon began work on the Tangent Line on June 13 and remained with it until late autumn. Their last record of work on it was made on November 13. It reads:²³

From the data of August 27th we computed how far the true Tangent Line would be distant from the Post (shewn us to be the Tangent Point) and found it would not pass one inch to the Westward or Eastward.

On measuring the angle of our last line, with the direction from Newcastle, it was so near a right angle that, on a mean from our Lines, the above mentioned Post is the true Tangent Point.

From the whole we conclude, that the Offset Posts in our last Visto, mark'd MD, are (as near as is practicable) in the true Tangent Line.

Mason and Dixon had the advantages of the bitter experience of their predecessors, of their own training, equipment, and wide experience,²⁴ and

²⁰ PMB, folders 97 and 92.

²¹ PLB 8: 54-55.

²² John Bird, *Dictionary of National Biography*.

²³ Charles Mason's Daily Journal, 1763-1768.

²⁴ Articles by H. W. Robinson and T. D. Cope in *Library Bulletins of American Philosophical Society*, annually from 1948 to date.

Rittenhouse to Rev. Thomas Barton dated Feb. 16, 1764 as follows:

I waited on Mr. Peters, as you desired me to do. . . . He paid me for my attendance at New Castle, and much more generously than I expected;—though I found it a very laborious affair; being obliged singly to go through a number of tedious and intricate calculations.

Mr. Barton comments:

The particular department of that business thus committed to Mr. Rittenhouse, seems to have been the fixing of the Circle—or at least, the tracing of its course or route, topographically:

The late Samuel W. Pennypacker kept the tradition alive in his article "David Rittenhouse the American Astronomer" which appeared in *Harp-er's Monthly* for May, 1882, and is republished in Pennypacker's "Historical and Biographical Sketches." In it the assertions are made that,

With instruments of his own manufacture Rittenhouse laid out the circle around Newcastle topographically, and alone he made a number of tedious and intricate calculations in such a satisfactory manner that he was tendered extra compensation. . . . Mason and Dixon . . . accepted Rittenhouse's circle without change.

It may be pertinent to point out that only a short arc of the circumference of the Circle, the mile and a half of arc just north of the Tangent Point, was a boundary between Baltimore and the Penns. The rest of the circumference was a boundary only along the arc that separated New Castle county from Chester county, which in those days included Delaware County. New Castle and Chester counties were both Penn territory and their line of separation was of no concern to Lord Baltimore, his officials, commissioners and surveyors, or to Mason and Dixon.

No mention of David Rittenhouse has been found in the Minutes of the Commissioners for Maryland and Pennsylvania from 1760 to 1768, in the Journal of Charles Mason, or anywhere in the records of that period, except in the record of the disbursements²⁷ made by Richard Peters, who was Provincial Secretary, a commissioner for Pennsylvania, and (until Joseph Shippen, Jr., succeeded him) disbursing officer who paid the bills of the survey for the Penns. No record of payments to Rittenhouse by Joseph Shippen, Jr., has

²⁷ Original Vouchers in Library of the American Philosophical Society.

been found.²⁸ The only mention of David Rittenhouse that this writer has found in the record of the Baltimore-Penn boundary survey during the 1760's is that made by Richard Peters²⁷ under date of January 30, 1764, to the effect that Rittenhouse was paid 6 pounds "for his attendance at the Middle Point and New Castle to take observation of the Latitudes."

For what uses did Richard Peters wish to know those latitudes? During the early 1760's it was "in the air" that reliable determinations of those latitudes could be put to good use. On December 20, 1760, Governor Sharpe said in a letter²⁹ to Lord Baltimore:

. . . An error that may arise from the Mensuration might possibly be discovered by taking Observations carefully at the two Points [Middle Point and Center of New Castle] for I am told that the Latitude of two Points on the Surface of the Earth might by a skillful Observer & with a proper & good Instrument be determined to a Second, which is equal to 102 feet measured on the Surface of the Earth.

And in their letter³⁰ to Thomas and Richard Penn of May 10, 1762, which Richard Peters joined his fellows in signing, the Commissioners for Pennsylvania united in saying:

Before we set out for Newcastle the Jersey Quadrant³¹ was brought hither from New York. . . . It would have given us some satisfaction to have known by the means of good Observation taken with such an Instrument the true Latitude of the Beginning and End of the Meridian Line, which has been run from the Middle Point and measured (as we believe) with a good deal of care; there having never yet, that we have heard of, been any attempt to determine the measure of a Degree of Latitude on the Earth's surface in North America. We should be the better pleased with an opportunity of determining this matter as we imagine it may come in Question in some of our future Operations respecting the West Line [Parallel]. When that Line comes to be run this Quadrant, or some other of equal goodness will, we conceive be necessary. . . .

In a letter³² of advice on how to run the Tangent Line written by Daniel Harris from Christ's Hospital on February 27, 1761, the first move sug-

²⁸ Records of Joseph Shippen, Jr., held by American Philosophical Society and by Historical Society of Pennsylvania.

²⁹ Correspondence of Governor Sharpe (Archives of Maryland), 2: 468-473.

³⁰ PMOC 9: 170.

³¹ Cope, T. D., The Jersey Quadrant used in Pennsylvania, *Proc. Amer. Philos. Soc.* 97 (5): 565-570, 1953.

³² PMB, folder 66.

gested is the finding of the difference of latitude between New Castle and the Middle Point.

From these quotations it is clear that both the Maryland and the Pennsylvania contingents had numerous reasons for wishing to know the two latitudes. The writer believes that their determination was the only occasion for the visit of Rittenhouse to the Middle Point and New Castle for which Secretary Peters paid him early in 1764.

About the story of Rittenhouse's "laying out the circle topographically" the writer continues to be highly skeptical. Mr. William Barton's original account was a surmise; Mr. Pennypacker's account is obviously an embellished revision of Barton's original. The circle around New Castle was first blazed by Taylor and Pierson in 1701. It was finally surveyed, adjusted, and marked for Delaware and Pennsylvania by engineers of the U. S. Coast and Geodetic Survey in 1892-93. An extended report on the history of the circular boundary and on the resurvey is published as appendix 8 to part 2 of the Superintendent of the Survey's Report for 1893. No mention is made in it of Rittenhouse's running of the circular boundary at any time.

As to the acceptance of Rittenhouse's circle without change by Mason and Dixon the following is to be said. The only arc of the circle that concerned Mason and Dixon was the mile and a half of arc which extends from the Tangent Point northwards. It alone of the whole circumference around New Castle is a boundary between former Penn. and Baltimore territories. Mason and Dixon surveyed and marked this arc during June, 1765, with no acknowledgments to anyone.³³

To bring out roughly the relative positions of Fenwick Island, the Middle Point, the Tangent Line, the Tangent Point, and New Castle there is inserted as figure 2 a line drawing. In it the Circle is much exaggerated to bring out the arc which is a part of the Delaware-Maryland boundary. This arc is the only part of the entire circumference that Mason and Dixon surveyed and marked.

It would be interesting to learn what "proper and good instrument" Rittenhouse used in making his "observation of the Latitudes" of the Middle Point and of New Castle. In an earlier article³¹ the writer has given his reasons for thinking that

³³ Charles Mason's Daily Journal (1763-1768), records June 1-18, 1765. Original in National Archives, Washington, D. C., photographic reproductions in Library of American Philosophical Society.

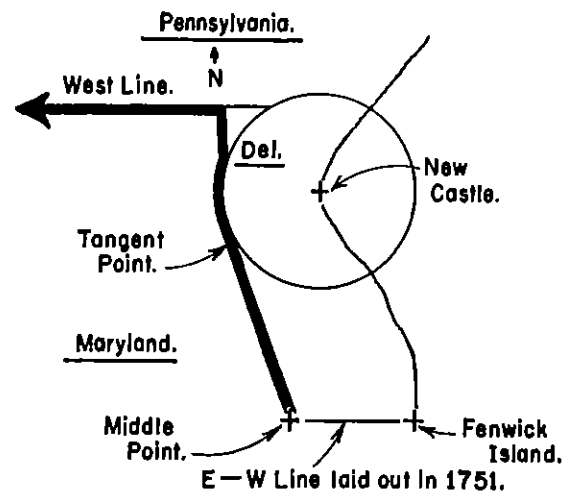


FIG. 2. This sketch is not drawn to scale; the circle is much exaggerated. The boundaries which were surveyed and marked during the 1760's ran from Middle Point to Tangent Point, thence around the arc and along the meridian to N, thence due westward to the Monongahela River and beyond it.

the Jersey Quadrant may have been used. It had been borrowed in 1762 for use on the boundaries.

The length of a degree of latitude in Maryland and Pennsylvania was measured by Mason and Dixon during their stay in America. The project was sponsored and financed by the Royal Society of London at whose request Astronomer Royal Maskelyne directed the work by correspondence. Equipment was in part borrowed from the proprietors and in part sent by the Society. Full accounts of work on the project are given in Mason's Daily Journal.³³ The work was reported to the Society late in 1768 after Mason and Dixon had returned to London. Papers by the Astronomer Royal and by Mason and Dixon appear in *Philosophical Transactions*.³⁴

Mentions of other advisers to the Penns and their commissioners have been found in the records. Provost Smith spoke of "Mr. Jack's and Mr. Alexander's 2^d Scheme as the best & nearly the same." William Parsons writing³⁵ on March 28, 1752 comments upon Mr. Jack's ideas on the way to lay out the circle about New Castle. Mr. Peters, writing³⁶ during early years of the survey, perhaps before 1760, discusses a scheme of running the lines by magnetic compass and refers to Mr. Alexander's tables showing Variation of Variation contrived for use with this scheme.

³⁴ *Phil. Trans.* 58, papers 41-43, 1768.

³⁵ *Pa. Arch.*, ser. 2, 7: 240.

³⁶ PMB, folder 101.

Mr. Alexander was probably James Alexander³⁷ or his son William.³⁷ Each served as surveyor-general of New Jersey.³⁸

There is on record³⁹ an undated letter from Mr. Grew, who says that he was employed in the survey. He sets forth principles and techniques that he would employ in running each of the lines. He advises about laying out the circle around New Castle, running a West Line from Cape Henlopen, or Phenin's [*sic*] Island, running the Tangent Line by compass, running a South Line from Philadelphia, and the West Line by offsets from an arc of great circle tangent to the parallel. Perhaps Mr. Grew was Theophilus Grew³⁸ a well-known schoolmaster of Maryland and Philadelphia. Not enough has been learned about the proposals of these three men to permit a fair appraisal of their significance.

The governor and commissioners of Maryland were advised by a group of able men who must be considered in a separate paper. The names of Hugh Jones, William Rumsey, Lewis Evans, Rev.

John Barclay, Professor Graham, Rev. Alex. Malcolm, and John Leeds have been met in the records.

The effectives among the counsellors were John Robertson and Daniel Harris who advised Thomas Penn. Lord Baltimore and Cecilius Calvert took advice from Dr. John Bevis. And in the end Dr. Bevis and Mr. Harris together drew up the "Hints" which the proprietors together entrusted to Mason and Dixon for delivery to Governor Hamilton and Governor Sharpe with strong recommendations that these "Hints" be given serious consideration.

When the survey of their common boundaries loomed before the Baltimores and the Penns as a common responsibility that must be met they received from advisers, both those invited to serve and volunteers, an array of suggestions as to how to lay out the lines. Over a period of years these suggestions were reviewed and amended, some discarded, some retained. A principal outcome was the "Hints" of Dr. Bevis and Mr. Harris. The phenomenon of able minds grappling with a problem and finally mastering it invites further study.

³⁷ *Dictionary of American Biography.*

³⁸ Cope, *op. cit.*

³⁹ PMB, folder 99.